

REMARKS

Claims 1-11 and 13-17 are pending in the application.

Independent claims 1 and 16-17 are amended above to make them more succinct.

No new matter is added to the application by way of these claim amendments.

I. THE OBVIOUSNESS REJECTION OF CLAIMS 1, 3, 5-10 AND 13-17

The examiner rejected claims 1, 3, 5-10 and 13-17 for being obvious over Gordon (USP 5,818,897) in view of Barrows (USP 6,020,953). The rejected claims are patentable over the cited art at least for the reasons recited below.

A. The Cited Art Does Not Disclose Or Suggest Every Claim Feature

Independent claims 1, 16 and 17 are nonobvious and patentable at least because Gordon does not disclose or suggest an image processing system that includes a plurality of linear arrays of detectors which are spaced substantially parallel to one another so as to image a plurality of areas of interest in a scene. The detector array (130) of Gordon relied upon by the examiner for disclosing this claim feature is a two-dimensional array. (See, for example, column 7, line 43 where the two-dimensional detector array (130) is introduced; column 8, lines 37-40 which distinguishes the two-dimensional detector array from a linear detector arrays of the prior art; or column 9, line 8). While the detector array is Gordon is described as being made up of a plurality of rows of detectors, it is clear from Gordon Figure 4 and the related specification description that these “rows” are not spaced “substantially parallel to one another to image a plurality of areas of interest in a scene”. The Gordon detector arrays are instead arranged adjacent to one another to form a single two-dimensional detector array which is only distinguished from prior art two-dimensional detector arrays by having smaller individual detectors. (See Gordon at column 9, lines 36-60). Therefore, instead of providing a linear array of detectors which are spaced apart to image a plurality of areas of interest in a scene as required by independent claims 1, 16 and 17, the detector array of Gordon is arranged to make a single volumetric scan. (See Gordon at column 8, lines 66 to column 9, line 5). In this way, Gordon can form a complete a CT scan of each bag.. As a result, all pending application claims are nonobvious and patentable over the cited prior art.

B. The Combination Of References Is Illogical

All pending application claims are also non-obviousness and patentable because the combination of Gordon with Barrows would be illogical to one of skill in the art at the time of the invention. The examiner recognizes that Gordon does not disclose a system which can be used to determine the direction or speed of the baggage movement. The examiner therefore concludes that one of skill in the art at the time of the invention would have incorporated the speed and direction measurement taught by Barrows into the Gordon scanner system. However, the combination of Gordon and Barrows would be illogical to one in the art at the time of the invention because such a person would understand that the relationship between the conveyor belt speed, direction of motion and location of the detector system must be known for the Gordon device to operate. The speed and direction would not and need not be detected.

The system described in Gordon relies upon knowing the speed at which the bags are transported through it in order to function, and this speed is chosen according to the required throughput and resolution of the apparatus. In particular, the parameters used in selecting the speed of the conveying system are described at column 8, lines 45-65 and at column 9, line 66 to column 10, line 5 of Gordon. These Gordon excerpts refer to a given speed in which the bags are transported through the system. The skilled person would be well aware that the speed of travel of the baggage is one piece of data that is required in Gordon to construct CT image from the data collected over time by the 2D detector array. In addition, in Gordon, the direction of travel of the baggage is “preferably parallel” to the direction of the location about a rotation axis of the scanning system but must in any case be known to construct a CT image. (See Gordon at column 7, lines 36-40). As a result, the system in Gordon relies upon a specific relationship between the direction of the conveyor belt and the detection system and the given speed of the conveyor belt. The examiner alleges that these factors are not taken into consideration in Gordon, but in fact the reverse is true: these factors are relied upon in Gordon as fixed values which allow the described apparatus to function. As a result, one skilled in the art at the time of the invention would understand that a device to detect the speed and direction and motion of the Gordon conveyor belt would be superfluous to the Gordon device since that information is already used to operate the device in the first place.

C. The Examiner's Motivation For Combining The References Is Unrealistic

All pending application claims are further nonobvious and patentable because the motivation cited by the examiner for combining the references is unrealistic. The examiner justified combining Gordon and Barrows on the grounds that one skilled in the art would combine the reference to compensate for movement of baggage that is slipping or rolling on the conveyor belt. This motivation is unrealistic. First, if the movement of the baggage through the scanning apparatus described in Gordon cannot be synchronized with the rotation of the scanning apparatus, the scanning operation will fail. Second, as a practical matter, the person skilled in the art would simply elect to rescan the bag – the complication and complexity of compensating for rolling or slipping of a bag in constructing a CT image would be immense and it is not described in any of the documents. It seems highly unlikely therefore that a CT image of a slipping or rolling bag would be of sufficient quality to allow the apparatus of Gordon to function for its stated purpose, *i.e.* to detect thin sheets of plastic explosives. Therefore, the skilled person would not be driven to consider making any estimates of the motion of a bag. Instead, they would use the “given” speed of the conveying system.

Yet another reason that the combination of references is illogical is because the resulting combination would be inoperable. Gordon discloses a system that uses x-ray detectors while Barrows discloses an optical system. In Gordon, the detectors are located on the opposite side of an object from an x-ray tube (128). (See for example, Figure 3A). As light such as that used by Barrow would be blocked by the object, it is not a practical to replace the Gordon x-ray system with an optical system such as disclosed in Barrows. Indeed, the invention of Gordon is intended to provide a volumetric scan whereas the system of Barrows used information captured from a two dimensional visual field. Therefore, replacing the volumetric x-ray scan system of Gordon with the optical two dimensional system of Barrows would not be practical as the Gordon system would become inoperable. Conversely, the examiner has not provided any factual basis that would support a finding that the x-ray system of Gordon is capable itself of operating in a manner disclosed in Barrows to detect relative motion and speed.

D. Many Dependent Claims Are Independently Patentable

Many of the dependent application claims are independently nonobvious and patentable. In particular, claim 3 requires the detectors to be visible light sensitive detectors. As noted above, Gordon discloses x-ray detectors. Replacing the Gordon x-ray detectors with the Barrows visible light sensitive detectors would cause the Gordon system to become nonoperational. Therefore, claim 3 is believed to be nonobvious and patentable over the cited prior art for at least this reason.

Claim 5 requires that each detector element in each linear array of claim 1 has associated therewith an independent noise limiting means. The examiner asserts that Barrows discloses this feature of claim 5. As an initial matter, applicant notes that Barrows does not teach linear arrays at all. Moreover, while column 18 of Barrows does mention use of a low pass filter to filter out noise that occurs as a result of electrical interference on the feature signal lines (see Barrows at column 18, lines 30-32), this low pass filter is not associated with a single detector. Instead, the recited low pass filter is acting on the output of a feature line, which has received a photo receptor signal used to generate four feature signals: there are fewer feature signals than there are detectors. (See Barrows at column 13, lines 40-63). For completeness, it is noted that there is a discussion in Barrows at column 9, lines 11-18 that the feature signal can correspond to the photoreceptor signal, but it is never explicitly mentioned that there may be noise limiting means associated with each detector element. For at least this reason, claim 5 is independently patentable over the cited prior art.

Claim 6 requires the noise limiting means of claim 5 to comprise an independent amplifier and filter. Claim 6 is nonobvious and patentable for the same reasons set forth above with respect to claim 5. Moreover, the examiner's rejection of claim 6 is factually incomplete because the examiner has not demonstrated why the prior art would disclose the use of an independent amplifier and filter as an independent noise limiting means associated with each detector element.

Claim 7 requires each detector array have its output read out sequentially from each detector element. The examiner asserts that Figure 8B of Barrows discloses this claim 7 feature. However, Figure 8B actually depicts the digitization of four input signals. (See Barrows at column 9, lines 26-30). The four signals do not represent the output of the signal detectors. Instead, they are generated from a photoreceptor signal. Nothing in Figure 8B suggests the

detector elements are read sequentially. There is mention in column 9, lines 11-18 of Barrows that the feature signals may correspond to the photoreceptor signals. Even in this case there is no indication that the detector signals are read sequentially. For at least these reasons, claim 7 is independently patentable over the cited prior art.

Claim 9 adds an additional detector array system to the system of claim 1 which may be switched on when an object is detected. The examiner's reference to column 5, lines 25-29 of Barrows for disclosing this teaching is not understood as the cited Barrows passage does not disclose anything that is relevant to claim 9. For at least this reason, claim 9 is independently patentable over the cited prior art.

Claim 10 requires the system of claim 1 to comprise several systems that are combined into a single unit arranged to give about 360° of azimuthal coverage. The examiner suggests that Barrows discloses the claim 10 feature but it appears from the cited Barrows passage that the examiner intended instead to rely upon Gordon for disclosing this feature. The cited Gordon passage merely discloses a rotating platform that only requires a single two-dimensional array which array is rotated to provide 360° coverage. What is recited in Gordon is completely different than what is claimed which is multiple systems of linear arrays which together provide about 360° coverage. Therefore, claim 10 is nonobvious and patentable at least because Gordon only discloses a single array as opposed to a multiple arrays as claimed. Claims 13 and 15 are patentable for at least the same reasons over the cited prior art.

Independent claim 16 and 17 are patentable over the cited prior art for the same reasons with respect to independent claim 1 above. In addition, in relation to claim 17, Figure 10 of Barrows does not indicate that the output from the photoreceptors is delayed. Instead, the figure indicates merely that the output from one photo detector at a certain time is equivalent to that taken by another at an earlier time, in case the horizontal movement of an object through the scene. As is explained at the top of column 13 of Barrows, the outputs will be slightly different, specifically not exactly delayed versions of each other, if the object is traveling at an angle relative to the detectors. The cited portion of Barrows is explaining the theory used to calculate motion and not a scheme for reading detectors: if a feature is moved from being captured by the detector A to being captured by detector B at a given time period, this indicates the object has moved in the scene. However, both detectors A and B will be providing an output throughout the time period. For at least this reason claims 16-17 are non-obvious and patentable.

II. THE OBVIOUSNESS REJECTION OF CLAIMS 2, 4 AND 11

Claims 2, 4 and 11 are patentable at least by virtue of their dependence upon claim 1 which is patentable for at least the reasons recited above. As noted above, the Gordon device uses x-ray detection methods. Claims 2 and 4 on the other hand are directed to the use of infra-red light detectors or a millimeter waveguide detectors. It would not be obvious to modify Gordon to include either type of detector because the transmitted light that would be detected by the claimed detector would be blocked by the baggage and the detectors would detect nothing. In addition, none of the cited prior art discloses millimeter wave systems at all. The small wavelength detectors described in Barrows are small wavelength radar detectors. The skilled person would expect a small wavelength radar travel wavelength in order of centimeters rather than in millimeters. None of the detectors described in Barrows are intended to provide penetrating scan of the object. Therefore it would not be obvious at the time of the invention to modify the teaching of Barrows to include millimeter wavelength imaging. For these reasons as well, claims 2 and 4 are non-obvious and patentable.

CONCLUSION

All pending application claims are believed to be patentable for the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

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Date: June 2, 2011

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